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Text is not the enemy: How illiterates' use their mobile phones

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ABSTRACT

Despite 800 million illiterate people worldwide little research has aimed at understanding how they use and appropriate mobile phones. We interviewed illiterate immigrants living in Switzerland to inform the design of phones and applications for illiterate users. We report on their use, coping strategies, and appropriation of mobile devices and other media to manage their lives. We found that text represented a valuable component for managing contacts in current smart phones. We provide design recommendations for mobile phone interfaces for illiterate and semi-literate users.

Author Keywords
HCI4D, ICTD, illiteracy, mobile phone use, touch screens

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Human Factors, Languages

INTRODUCTION

Around 800 million people worldwide cannot read or write their mother tongue. Most of them live in developing countries and the majority of those in rural areas. The business model of mobile phones has proved viable in developing countries and coverage has been improving despite infrastructural shortcomings in terms of, e.g. the availability of electricity. Penetration of mobile devices has taken off despite limited power availability for charging devices, high call charges, and high cost of ownership relative to income. While much ICTD (information communication for development) research has found problems and shortcomings of mobile user interfaces (UI) in usability tests, e.g. icons that are not culturally adapted [7], no local language support and hardly any support for illiterate users, uptake of these devices "*in the wild*" is staggering. It is clear that incentives to overcome initial UI hurdles are underappreciated [13]. Given the current technological speed of advances in the mobile domain we can assume that within the next few years low-end smart phones (most likely with touch screens) will become affordable for illiterates in developing countries. We look at how illiterate immigrants in Switzerland have appropriated smart and feature phones in their daily life to inform the design of smart phones UIs to make them more accessible and easier to use by illiterates.

The background summarizes previous ICTD work on illiterates and user interfaces (UI) tailor made for them. The results from interviews we conducted with illiterates include their use, coping strategies, and appropriation of mobile devices and other media to manage their lives. In the discussion we argue for better supporting text in conjunction with other media in mobile devices for illiterate and semi-literates.

BACKGROUND

Literacy can be defined in many ways. The U.N. defines a literate person as someone who can "…*with understanding, both read and write a short simple statement in his or her everyday life*" [15]. Illiterate people may have basic numeracy skills, i.e., they can to some degree understand, read and write numbers. The two most noteworthy exceptions to the dearth of published research on illiterate mobile phone use are Chipcase [2] and Lalji *et al.* [7]. Conducting ethnographic studies of illiterate mobile users in several Asian countries, Chipchase reported that while illiterates could successfully turn on their phones and accept incoming calls, dialing numbers to make outgoing calls proved difficult for some. Nor could the illiterate users send text messages or use the address book on their phone. Lalji *et al.* found that illiterates used call logs in lieu of the address book [7] but that this proved challenging when having to remember how many calls ago someone had called.

More research on illiterates and their needs mobile phone UIs has been conducted in lab studies. This body of research concurred about the value of audio support and

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graphics in UIs for illiterates but provided differing recommendations or went against current design conventions. Controversial UI topics included the issues of in- [16] or exclusion [12],[11] of text labels, and use of drawings [10] instead of icons. Common UI components - the concept of soft-keys, vertical scrollbars, short text labels [8], [9] and the concept of a focus in lists [7] - were described as hard to understand. To some degree, these findings run counter to Chipchase and Lalji *et al*.'s results, the large increase in mobile phone ownership of illiterates and semi-literates despite employment of these UI concepts, and that computer literates had to learn these conventions, too. We need to understand how illiterates eventually use their mobile phones when embedded in a socio-technical context in real life. In summary, more research is warranted, especially considering the rapid uptake of mobile phones in the developing world by illiterate and semi-literate users and the current changes in the mobile phone market with its trend towards smart and touch screen phones.

STUDY

We carried out semi-structured interviews (60-90minutes in duration) in cafes or the participants' homes. All 9 participants (7f, 2m) had immigrated from Africa or Latin America to Switzerland and recently started a course to learn how to read and write. The interview included topics such as a typical day, problems or inconveniences faced, media used in the home, means of communication and information, interacting with necessary machinery, e.g. automated teller machines (ATMs), and a focus on the use of their mobile phones. We wanted to know how they received and placed calls and managed contacts; we also probed for other functions that they used.

Outside the phone

Our participants employed a number of strategies to retrieve telephone numbers of contacts that were stored on paper, e.g. business cards, telephone registers and pieces of paper that they could tell apart from spatial arrangements locations in note- or telephone registers, special colors of ink or paper, patterns, doodles, or shapes of paper, business cards (some enhanced with the owners' pictures). Spatial location in the homes (near or on doors, fridges, calendars, telephone register) aided recall through opportunistic encounters and provision of additional context.

Unlike in Lalji's study our interviewees could all tell digital time and read numbers. Almost half of the Swiss participants made use of paper calendars to some degree. Almost exclusively they only noted down the times of meetings in the slot for a day (on calendars with a grid) not with whom or where. One exception to these handwritten notes were cards given to them for doctor's appointments that contained the time, date and contextual information about the doctor.

Our interviewees faced problems finding their way around or recovering from getting lost in the city. They often asked for directions, described landmarks to friends on the phone or took taxis home to recover from being lost. They also had trouble meeting dietary or religious requirements when shopping for food.

Living in a foreign country, our participants needed to stay in touch with family and friends in their home countries. Calling abroad was expensive and they often used internet cafes' to make calls through special operators or VoIP, which required synchronizing with the other party to be at a certain place at a certain time. Many considered asynchronous communication such as SMS a convenient and cost-efficient alternative for staying in touch. Moreover, some had been asked by others to send texts rather than call. However, the need to read and write seemed an insurmountable barrier to using the SMS feature to contact people.

Inside the phone

The director of the school who put us in contact with our participants was not sure whether they were actually using mobile phones. However, all of our interviewees owned at least one mobile phone. The phones they used were surprisingly advanced and expensive. The latest iPhones or other fashionable feature phones were common. A typical response when prompted about their decision to obtain these high-end phones was: "*Everyone has these [pointing to his iPhone] now – so why shouldn't I? Just because I cannot read doesn't mean that I'm stupid*." However, due to their high reliance on voice calls many participants had relatively expensive calling plans and the interviewee above had been offered the iPhone as a free upgrade to his 99 CHF per month plan.

Rote memorization

The speed at which they traversed the phone menus was the same as for literate people. We often had to ask our interviewees to slow down when they were showing us how they performed certain tasks on their phones. They mastered important functionality through rote learning: "*After I have clicked on this icon I need to go down twice and then – click! - I'm done.*" This was the same technique that they used to learn how to operate other important digital interfaces such as ATMs and game consoles. Family or friends assisted during the memorization phase and they repeated the procedures in their presence as many times as needed. Icons served as landmarks and sometimes the shape or length of text allowed the people to orient themselves in the interface. Continuous help was necessary for smart phone owners to download apps, games, music, ringtones, install customizations (e.g. a different unlock button on the iPhone) and both celebrity and personal picture wallpapers.

Text messaging

All of them had received text messages, though they were often unsolicited. How they dealt with received text messages varied and depended to some degree on the content. Some had developed simple heuristics in detecting unsolicited messages through the length of the sending telephone number and the fact that the message contained a lot of text. Most interviewees responded to an incoming SMS by calling the sender – either they had memorized how to do this through the context menu or they noted down the number and typed it into the phone again. Some of our interviewees treated all messages as spam and had learned either how to exit the received message mode or how to quickly delete them without checking the content or their origin. Others asked for help with the content of the text messages. None of the interviewees felt particularly bad about this approach but one who was in a new relationship found asking close friends to read messages with romantic content exciting at first but then increasingly annoying. One participant wondered whether it would be possible to forward a message to a service and listen to the content on the phone through a human or machine voice.

Retrieving contacts

Call logs were valued for their quick access and all of our interviewees made use of them. One *recently contacted* log, which aggregated recent calls of contacts and sorted them in descending order and left the most recently contacted person on top (either as a telephone number or the name of the contact) was particularly valued by its user: *"This is the single most useful thing about this phone. One button click and I'm with my daughter [the only text entry on the top of the list]."* All the interviewees besides her had more than 50 contacts stored in their address books. The few completely spelled out names (first name or full name) had been entered by friends or family members themselves. The names often served as symbolic icons or landmarks since most remaining contacts or call log entries contained only numbers. However, the use of some text allowed them to filter and group large amounts of data. Some had taken these entries as seeds to venture further. *"[pointing to the textual contact list entry] This is Michel. So I know his name starts with M. So this must be an M. And I have this other friend, Mmmmansour. He starts with M, too. So this is an M and down here [pointing to the keyboard] is the M and I enter it. But the rest I cannot write and I just make it up."*

Many entries were either approximated by the first letter of the name supplemented with invented characters, e.g. Mx#--, or just the first letter of the name. However, in many cases, and especially with duplicates resulting from the first letter strategy, they had to open each contact individually and try to recognize the contact. They did this by checking the country code, city code, other salient features in the telephone number, e.g. repetitions "222" or, in many cases, its last three digits. The more duplicates, the more onerous this task became due to the way the address books treat entries that contain first or last names. In the list views of call logs and the address book text took precedence and was shown in lieu of the number that was shown for entries without text. All of our participants knew how to take pictures and retrieve them but their use for contacts was limited.

Three of our interviewees had stored SMS messages that contained telephone numbers for months as another way of looking up contacts. *"I know X sent me this text message that has the telephone number from a friend of mine in Togo. So I go back here [to the inbox of his messages] and need to find his message. Here this is it. He wrote this text in front of the number – my wife read it to me. It's the name of the friend."*

Calendar use

Some illiterates used the calendar in their mobile phone to identify the current date or - for those that had learned the mapping of written words or their short hands (MTWTFSS) to the weekdays - the day of the week. A large proportion of the participants made use of the alarm functions on their phones and one of them had extended this to keeping alarms in his iPhone as reminders for meetings, events and appointments. The only information stored in the alarm was the time. This was different from the use of paper calendars insofar as the remaining information, e.g. the day of the week or the date and the purpose of the commitment, had to be remembered. This required diligence in deleting alarms after each event had occurred, e.g. a doctor's appointment; otherwise the participant explained that he would get confused and try to remember what an alarm was supposed to remind him of. A separate application reminded him when it was time to pray.

Child mode

The three mothers we interviewed had used their mobile phones to pacify their children despite worries about the children changing or deleting information. They were interested in having a way to secure the phone such that their children could safely play with it without deleting contacts, incurring costs, or changing settings.

DISCUSSION

A number of studies have suggested removing text from UIs for illiterates. However, we think that this might be a foregone conclusion based on the reliance on UI usability testing without considering the long-term appropriation of applications and the different roles of text as part of a status symbol, a generic or learned symbol capable of disambiguating, and as an aid in proxy-literacy.

Phones were as much a status symbol for illiterates in Switzerland as in developing regions [2]. The Motorola Motofone F3 designed for poor, illiterates was light, very rugged, and provided audio feedback for its functions from

power on throughout its main (minimal) menu. Its e-ink screen could easily be read in bright sunlight, it had a phenomenal battery life (nominally 30 days on standby) and, at around 20USD it was affordable. However, it was not a success. According to an unnamed Motorola source the company had underestimated the aspirational aspects of the device. Given that many people see mobile phones as extensions of themselves they did not want to be seen with a cheap phone.

Chipchase argued against making phones for illiterates recognizable because of the associated stigma. Text-free interfaces could give away someone's illiteracy as mobile phone UIs are often visible to others. The same goes for constant audio feedback as provided through current accessibility tools (iPhone, talkback on Android) that target visually impaired users and read out all UI parts.

All the techniques illiterates used in the physical world to manage information, e.g., spatial arrangements, shapes, colors, handwriting and doodles, were absent from contact lists and calendars in their phones. Pictures in address books were one of the few exceptions but these are not always available for contacts, are not searchable and cannot filter large lists. For our participants text provided some valuable benefits that many of our participants reaped over time. In their address books even some text proved useful to identify, disambiguate or search contacts. Unfortunately, our participants' address books supplanted the telephone numbers in the interface in an *either text or number* fashion which complicated identification due to many duplicate names. The current reliance on text as the main method for accessing and storing information on mobile devices is making the learning stage for illiterates cumbersome. However, removing text would cause problems for the literates enlisted to help the illiterates learn to operate the device. Omission of text would not allow people to discover and encourage use with one of humanity's most valued cultural techniques. Srivastava [14] an India NGO has started encouraging women to buy mobile phones English because of the potential to learn various alphabets through them. Every day exposure to text in conjunction with audio in same language subtitles of movie content was also shown to improve reading and writing skills in neo-literates [6]. Semi-literates in Findlater et al.'s study benefited from combination of text and audio and had superior word recognition at the end of each session after the second day of use [3].

DESIGN RECOMMENDATIONS

We derive the following design recommendations for smart phones for illiterates from the findings and related work:

A. Avoid stigmatizing physical design of the phone

B. Use text in the interface for controls (plus icons) and content to aid helpers

- provide audio feedback in the interface as suggested by Mehdi et al. but on-demand (e.g. to support answer to "*What is this?*") and not 'always on' as in accessibility functions for blind people. In touch screen phones this will be easier to achieve through a consistent gesture such as a long-tap.

- provide audio rendition for text messages (read-out function) as done in [4]

- provide speech to text entry for SMS composition

- integrate audio feedback on maps for textual content such as street names and landmarks

C. Enhance contacts and their listings by providing additional graphical discriminators (colours, symbols) as done in work by Bhamidipaty *et al.* [1] and Joshi *et al.* [5].

D. Augment calendars with voice notes, pictures and drawings/doodles

E. Provide access to voice note reminders based on location (audible post-it notes)

F. Provide a child-safe (read-only) mode

G. Include name, number, date and time in the last call list entries

CONCLUSION

Designing for illiterates should leverage multiple media and create more robust and supple interactions in the socio-technical setting in which they learn and make use of mobile devices. Illiterates aspire to owning the same phones as literates and have effective coping strategies to overcome their inability to read both in the physical world and on mobile phones. The latter, however, have reduced capabilities to structure and recall information. Contrary to earlier research on illiterates we found that immigrants in Switzerland made used of contact lists and SMS, to some degree, to manage contacts. A number of changes to mobile phone UIs could empower them further: optional text-to-speech throughout the interface especially for SMS, OCR-to-speech, the ability to attach voice notes and possibly pictures to calendar entries and contacts, maps with audio support for reading out the names of roads and landmarks, and contact managers that allow for filtering through visual attributes and read-only access children.

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REFERENCES

1. Bhamidipaty, A. Symab: Symbol-based address book for the semi-literate mobile user. *Human-Computer Interaction–INTERACT 2007*, (2007), 389–392.
2. Chipchase, J. Understanding non-literacy as a barrier to mobile phone communication. *Retrieved September*, 2009. from http://research.nokia.com/bluesky/non-literacy-001-2005/index.html.
3. Findlater, L., Balakrishnan, R., and Toyama, K. Comparing semiliterate and illiterate users' ability to transition from audio+text to text-only interaction. *Proceedings of the 27th international conference on Human factors in computing systems*, ACM (2009), 1751–1760.
4. Friscira, E., Knoche, H., and Huang, J. Getting in touch with text: Designing an application for illiterates to harness SMS. *Proceedings of ACM DEV 2012, 2nd Annual Symposium on Computing for Development*.
5. Joshi, A., Welankar, N., BL, N., Kanitkar, K., and Sheikh, R. Rangoli: a visual phonebook for low-literate users. *Proceedings of the 10th international conference on Human computer interaction with mobile devices and services*, (2008), 217–223.
6. Kothari, B., Takeda, J., Joshi, A., and Pandey, A. Same language subtitling: a butterfly for literacy? *International Journal of Lifelong Education 21*, 1 (2002), 55–66.
7. Lalji, Z. and Good, J. Designing new technologies for illiterate populations: A study in mobile phone interface design. *Interacting with Computers 20*, 6 (2008), 574–586.
8. Medhi, I., Gautama, S.N., and Toyama, K. A comparison of mobile money-transfer UIs for non-literate and semi-literate users. *Proceedings of the 27th international conference on Human factors in computing systems*, (2009), 1741–1750.
9. Medhi, I., Patnaik, S., Brunskill, E., Gautama, S.N.N., Thies, W., and Toyama, K. Designing mobile interfaces for novice and low-literacy users. *ACM Trans. Comput.-Hum. Interact. 18*, 1 (2011), 2:1–2:28.
10. Medhi, I., Prasad, A., and Toyama, K. Optimal audio-visual representations for illiterate users of computers. *Proceedings of the 16th international conference on World Wide Web*, (2007), 882.
11. Medhi, I., Sagar, A., and Toyama, K. Text-free user interfaces for illiterate and semiliterate users. *Information Technologies and International Development 4*, 1 (2007), 37–50.
12. Shakeel, H. and Best, M.L. Community Knowledge Sharing: An internet application to support communications across literacy levels. *Technology and Society, 2002.(ISTAS'02). 2002 International Symposium on*, (2002), 37–44.
13. Smyth, T.N., Kumar, S., Medhi, I., and Toyama, K. Where there's a will there's a way: mobile media sharing in urban india. *Proceedings of the 28th international conference on Human factors in computing systems*, (2010), 753–762.
14. Srivastava, Kendra. Indian Women Learn Alphabets on Handsets. *Mobiledia*. http://www.mobiledia.com/news/122456.html.
15. UNESCO. Gender and Education for All: The Leap to equality. 2003. http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/efareport/reports/20034-gender/.
16. Wiedenbeck, S. The use of icons and labels in an end user application program: an empirical study of learning and retention. *Behaviour & Information Technology 18*, 2 (1999), 68–82.